

NORMAL HUMAN AGING:
The Baltimore Longitudinal Study of Aging

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CHAPTER VII

BLSA: Acta and Agenda

INTRODUCTION

We have emphasized that this book is a progress report on the first 23 years of the Baltimore Longitudinal Study of Aging (BLSA), which has addressed a broad spectrum of questions about physiological, psychological, and psychosocial variables in the processes of aging. Despite its 23-year span, the bulk of its members have been followed for only about 13 years of their lives; since half of the participants were enrolled before they had reached age 50, substantial numbers of participants have not yet been followed into senescence and advanced old age (85 and older). The book is thus an interim report—a fact that receives further emphasis when we consider what we have learned and what still remains to be investigated.

INDIVIDUALITY AND SPECIFICITY OF AGING

Aging cannot be equated to a disease or disorder, nor can there be hope for a “magic bullet” that will cure or stop it. In the past 20 years most gerontologists have recognized the distinctly limited utility of a simple and sovereign notion of aging. Instead of hypothesizing a unitary or uni-causal process of aging, researchers have emphasized the need to consider the interacting influences of biological processes, personality and behavioral factors, social and environmental forces, and the idiosyncratic health behaviors and stresses of the individual. Similarly, the BLSA experience has made clear the complexity of aging processes. Instead of a single underlying mechanism, aging is now regarded as reflecting the expression of a host of processes that independently and in concert in the individual bring about the changes we recognize as aging. The BLSA experience has shown that multi-disciplinary longitudinal studies provide a fertile basis for generating and testing hypotheses regarding aging processes in men and women.

BLSA data indicate that aging is a highly individual process. Although cross-sectional observations show a significant decline in many physiological variables over the total age span, individual differences are very large. In some variables, individual 80-year-old subjects may perform as well as the average 50-year-old. Aging is highly specific not only for each individual but also for different organ systems within the same individual.

Because of the high degree of specificity of aging among different subjects and among different organ systems, chronological age itself is not a very reliable predictor of performance in individual adults. Recognition of this great diversity may prove of value in devising interventions to improve performance in normal aging subjects or for subgroups. Although no single “treatment” is likely to be discovered that will improve various kinds of performance in all or most people, a variety of different interventions or treatments tailored to critical personal characteristics might be developed that would be effective for those individuals.

The discrete character of various physiologic and behavioral functions has been confirmed by several analyses that have found no statistically significant factor common to them. The conclusions—that there is no single process of aging, and that so-called “physiological indices of aging” provide no better predictors of individual performance than chronological age—confirm the BLSA’s choice of a multidisciplinary and multivariate approach, both over its 23-year history and in future studies that will address the problems it has identified.

PATTERNS OF CHANGE WITH AGE

From the mass of research results presented in Chapters V and VI, we can readily conclude that there is no one uniform age course for all variables. The evidence is conclusive that there are a variety of changes with age, of which we might identify six types or patterns. One pattern is stability, or the absence of any meaningful change with age in important functions or aspects of the person, ranging from resting heart rate to personality characteristics. The second pattern is characterized by declines with age that are due not to aging *per se* but to illnesses associated with age. Thus, although earlier studies reported a significant decline in plasma-testosterone levels with age, analyses performed on subjects who were carefully screened for diseases revealed no such age differences among healthy men. A third pattern shows steady declines in function in spite of good health or the absence of disease; creatinine clearance is a classic illustration of intrinsic change. Changes that occur precipitously in old age form a fourth pattern; such changes are often expressions of disease or closely related to disease, as in dementia. Other apparent changes may actually represent the body’s attempts to maintain function with advancing age. This fifth pattern of change, exemplified in the posterior pituitary response to hyperosmolality and in the use of the Frank-Starling mechanism to maintain cardiac output during exercise, might be termed compensatory. The sixth type of change that occurs with the passage of time has little or nothing to do with age, or with health and disease, but reflects cultural changes that are of importance in interpreting research data on aging. A clear example of this is provided by the nutritional data indicating reduction of dietary cholesterol intake over the historical period during which BLSA data have been collected.

An intriguing opportunity for further research lies in those functions, predominantly psychosocial, that do not change with age, or change only late in life and in minor degree. The implications for both geriatric practice and social policy of the finding that personality is relatively unchanging, and that cognitive functions decline substantially only after age 70—and even then are in part stabilized by compensatory changes—must be studied both in the BLSA, in women as well as men, and in other populations. Perhaps the most important goal is an understanding of the underlying mechanisms responsible for both stability and change.

Complex physiological functions that require coordination among different organ systems show greater decrements with age than more simple responses. Some of the major impairments of aging may be due primarily to breakdowns in various regulatory mechanisms that reduce the adaptability of the individual, e.g., the age-related diminution in cardiovascular response to catecholamines. The effectiveness of any regulatory mechanism depends on its ability to detect the presence of significant deviations and to institute measures to counteract displacements. Both these mechanisms (loss of sensitivity and of responsivity) contribute to the phenomena of aging.

In its study of both physiological and psychosocial functions the BLSA has found evidence of mechanisms that in part compensate for declines that accompany aging. Examples range from cognitive to cardiac to aerobic function, and may result not only from voluntary actions by the individual (such as the cessation of smoking) but also from adjustments of which the individual is unaware (as when a deficit in memory is in part offset by increases in knowledge). Identification of the mechanisms underlying such compensatory adjustments might lead to the development of interventions that would enhance the quality of life of the elderly.

One of the fundamental endeavors of the BLSA has been to study the effects of aging as discrete from those of disease. Routine medical examinations have been supplemented by diagnostic procedures, such as stress testing, that make possible identification of diseases that would otherwise have remained occult. Screening for these illnesses allows investigators to study aging in large samples in the absence of clinically detectable illness. At the same time, longitudinal data from individuals who develop specific conditions can be used to follow the course of those diseases.

Analysis of BLSA longitudinal data indicates that a precipitous drop in any physiological or behavioral function is likely to be a manifestation of a pathological condition. A corollary is the hypothesis that, in variables that remain essentially stable over the adult life span, any significant change may be a manifestation of pathology. Further study of this hypothesis will be an important part of future BLSA analysis.

The work of the BLSA is just beginning. The establishment of a data base sufficiently large and exhibiting enough points of measurement over a period sufficiently long to make possible longitudinal, time-sequential, and cross-sequential analysis provides the ground for more sophisticated investigations of the questions it has already addressed, as well as of new questions that will arise in the process.

FUTURE DIRECTIONS

It is not possible to chart with any great degree of precision the specific directions of future research. Research directions are continuously under scrutiny and revision, and new investigators bring with them new methods and hypotheses. But we may sketch a few broad areas.

The failure of aging in some body systems to predict aging in other systems calls attention to the need both for more complete description of the course of aging and for more theoretical understanding of its mechanisms in each individual system. The intensive investigation of specific functions will thus remain an important part of the BLSA's mission.

The relative homogeneity of the BLSA population has made it possible for investigators to exclude from analysis factors or influences that show variation across demographic and socioeconomic parameters, and has speeded the identification of a variety of age-related patterns of stability and change. The validity of its findings for other populations, however, remains to be demonstrated. What we know now is to a great extent conditional on the subjects we have studied, the populations they are drawn from, the methods we have used, and the historical period in which the subjects have lived and been studied. Whether the patterns we have found will be repeated in other ethnic and racial groups, other historical periods, and other aspects of aging are studied remains unpredictable. In the near future one of the most significant aspects of

generalizability will be tested, when longitudinal analysis of data on BLSA women will begin.

In the psychosocial area, another promising line of research will address the means of promoting health and independence in older individuals, particularly through research on the lifecourse patterns of health behaviors and their emotional, interpersonal, and experiential correlates. Future research is likely to emphasize the role of lifelong personality dispositions in shaping characteristic modes of perceiving health, maintaining fitness, and coping with illness. At the same time, research needs to consider the influence of life stresses and social supports on mental and physical health and functioning. Studies previously conducted on men will need to be extended to women, and sex differences (physiological, psychological, and social) must be examined for their possible significance in explaining differences between men and women in health and longevity.

As the BLSA engages new fields of research, and possibly new and more broadly representative populations—the longitudinal analysis of the data from the study of women is the most immediate example—it will be able to retest past findings and to determine the validity of new ones. Despite the conceptual and empirical gains won from our longitudinal and cross-sectional investigations, a great many questions remain to be answered. Only a few cohorts have been studied, and only over two decades of historical time. How other cohorts will age, and how other historical periods may influence the aging of its members, awaits further observations on this population as well as on others. In a society in which older people are exploring new roles and new solutions to old problems, the scientific and social importance of such study cannot be sufficiently emphasized. In short, the findings of the BLSA now constitute a kind of gerontological agenda for the future.